

Location Relativity in Space and Time: Some Evidence from Swiss Municipalities, 1950-2000

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Is Location a “Fixed” Asset?

- In urban and regional studies, a favorable location (e.g., proximity to an international border or sea shore) is often assumed to offer to an urban place an entire lifespan of comparative advantage.
- In other words, the importance of individual location attributes is assumed to remain constant over space and time.

Is this assumption correct?

Location: time-place dependency

- According to previous studies (see inter alia Cheshire and Magrini, 2006); Portnov and Schwartz, 2008), the importance of any location attribute is likely to be place dependent. In particular, the same location attributes (e.g., proximity to sea shore etc.) may have different importance in developed vs. less-developed countries; warm vs. cold and rainy regions, etc.
- The relative importance of location attributes may also change over time (e.g., mineral resources in early phases of industrialization vs. cultural and environmental attributes today).

Some examples of place dependence of location attributes

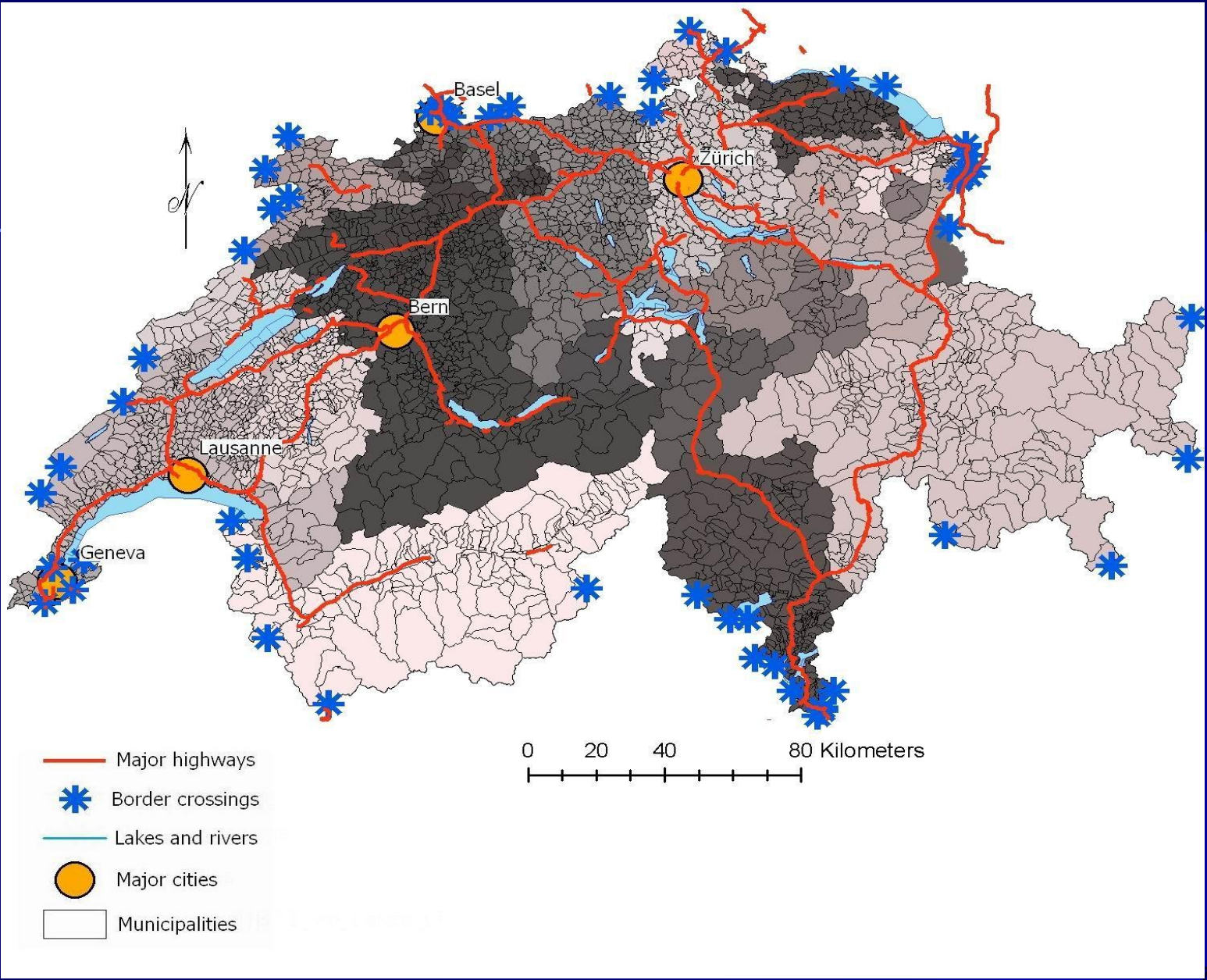
- **100 km** is a commonly-traveled distance in Australia but an insurmountable obstacle to inter-urban interaction in Nepal;
- **-60°C (-76F)**: pupils do not go to school and play soccer outdoor in Siberia; elsewhere such a temperature is considered unbearable for humans;
- **2000m+** above the sea level: rapidly growing cities in Ecuador, Mexico and Ethiopia; elevations unsuitable for major cities elsewhere.
- **500,000** residents: a major city in Europe; provincial town in China.

Two working hypotheses for empirical testing

- Within a system of mutually competitive urban places, the long-term development of an urban community is more likely to be affected by relative location advantages (vis-à-vis other places in the country), rather than by 'absolute' location attributes.
- The relative importance of location attributes is likely to change over time.

Switzerland as a case study

- Switzerland is subdivided into 26 cantons and 2889 municipalities, ranging in population from 22 people (Corippo) to 363273 residents (Zurich).
- The country has four major conurbations - Zürich, Bern, Lausanne and Geneva; only Basle lies north of the Jura.
- A large number of middle sized cities complement the Swiss network of major population centers; many of them host highly specialized manufacturing and service industries.



Data sources:

- Swiss census: population of municipalities, age structure, employment etc.;
- Accessibility: the log-sum of opportunities available at surrounding locations divided by an exponential function of travel costs;
- Climatic data - Swiss-meteo;
- Lastly, location attributes (i.e., distances from to the nearest motorway, rivers, nearest international border crossing etc. were calculated using ArcGIS layers.

Municipal growth performance

Population change in municipalities was calculated using population growth rates (\ln) in five decades:

- 1950-1960
- 1960-1970
- 1970-1980
- 1980-1990
- 1990-2000
- ⋮

Explanatory variables:

- Public transport accessibility (Access I)*
- Road transport accessibility (Access II)*
- Industrial employment (Employment I)*
- Service based employment (Employment II)*
- Distance from the major population centers
- Distance to rivers
- Distance to border crossings
- Distance to mayor roads
- Sunshine days and amount of precipitation
- Cantonal dummies (fixed effects)

*used as alternative measures

Calculation of location attributes

- In the first stage, explanatory variables (proximity to the coast, proximity to major cities, etc.) were represented by absolute values.
- In the second stage, the absolute values were divided by the average values observed in each canton and the quotient was then used in rerunning the analysis.
- **Expectation:** If there is *no* difference between the effects of absolute vs. relative (canton-standardized) location parameters, then *both estimate types would show similar strength*.

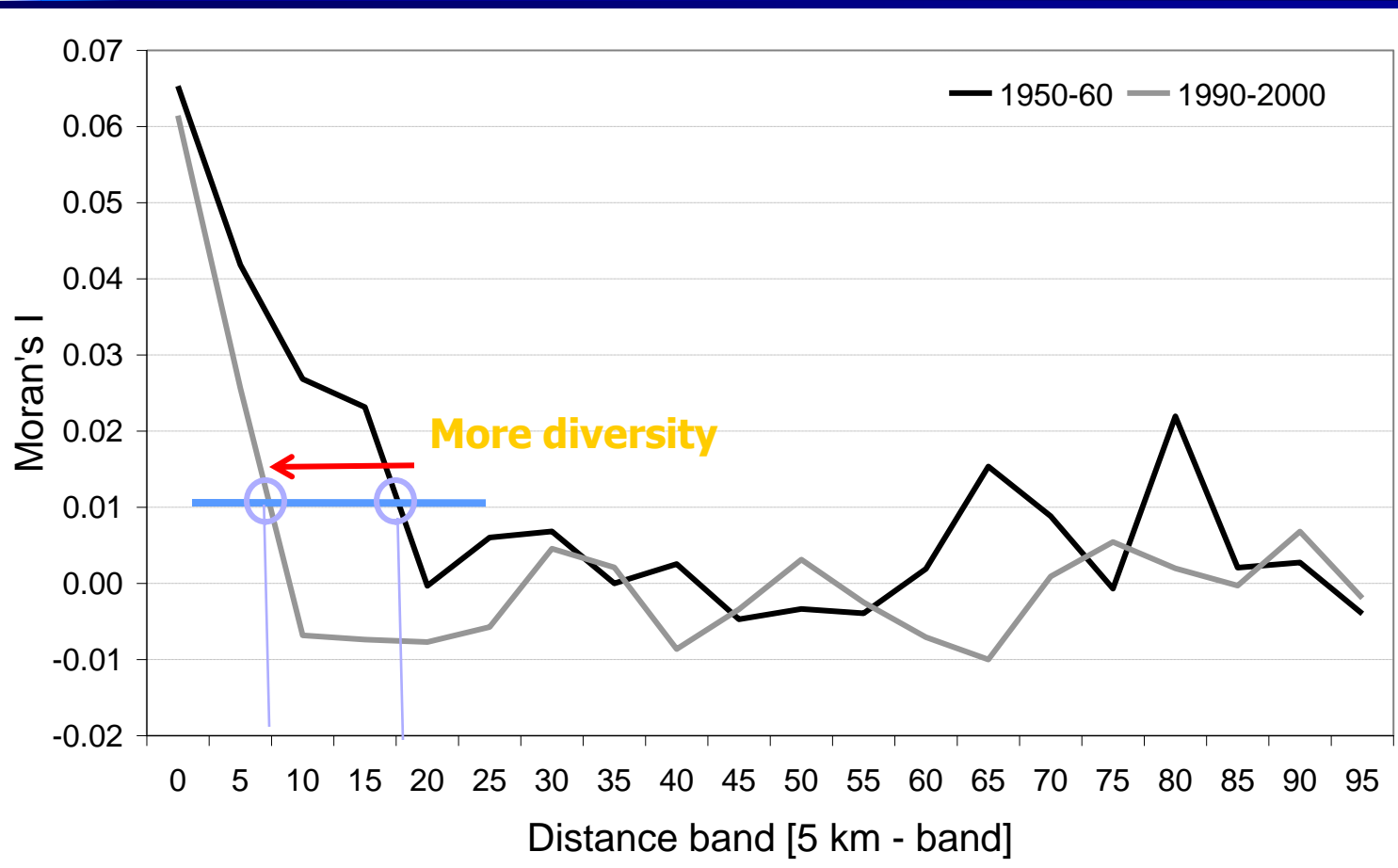
Three-stage analysis:

1. Regressing population growth rates on absolute location attributes;
2. Regressing population growth rates on relative (canton-standardized) location attributes;
3. Tracing changes in the relative strength of variables over time

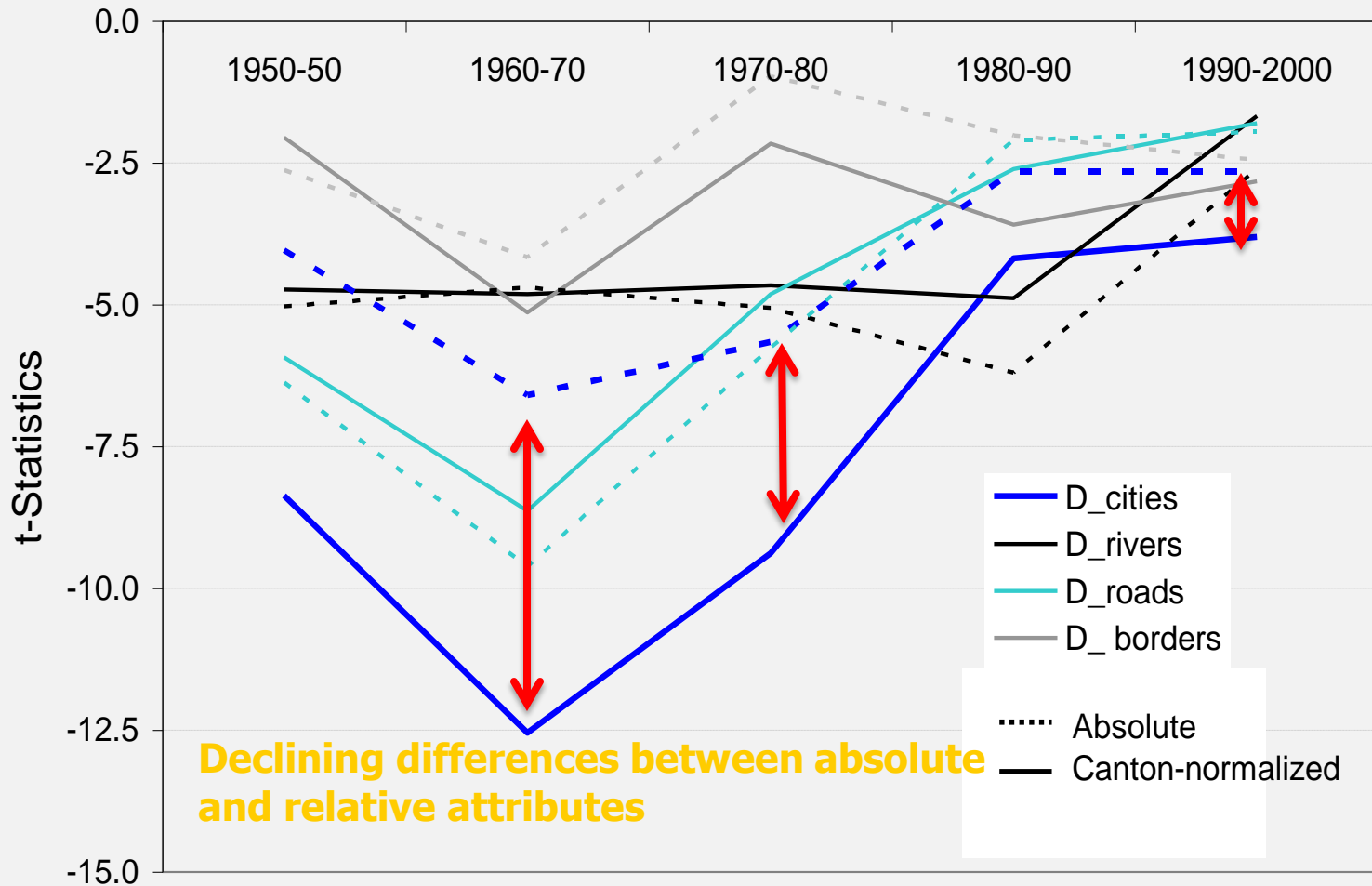
[Both OLS and spatial lag models were used]

Summary of Empirical results

Spatial autocorrelation of OLS residuals



t-statistics from OLS models before and after normalization



Conclusions:

- The development-fostering effect of any given location attribute is likely to depend on whether other places possess it as well. Thus, proximity to a main road may attract newcomers and businesses to a municipality in a region in which other municipalities have no good road access. However, the effect of road proximity may be much weaker if other places in the region enjoy similar infrastructure services. Location advantage is thus likely to be a relative notion: it may matter intra-regionally rather than nationally or internationally.

- The relative importance of location attributes may also have a temporal dimension: Whereas in the initial stages of economic development, connectivity, and proximity to basic resources are likely to dominate location decision-making, as an economy develops, new location-related elements may gain importance. These may include climatic differentials, etc.

- A somewhat unexpected finding of this study is that differences in the statistical significance levels of absolute and canton-standardized location attributes show a clear tendency to *decline over time*, becoming marginal in 1980-2000, in both employment and accessibility-based models. This may be due to increased population mobility, which reduces the importance of cantonal boundaries as geographic obstacles to the flows of goods and commuters.

Thank you!